Chapter 3
Regional Investigations and Site Reconnaissance

3-1. General

Regional geologic and site reconnaissance investigations are made to develop the overall project geology and to scope early site investigations. The required investigation steps are shown in Figure 3-1. Detailed guidance on the conduct of these investigations is contained in EM 1110-1-1804. Additional guidance specific to determining the probable need for a test quarry, development of potential test quarry locations, and definition of necessary site investigations is provided in the following paragraphs.

3-2. Initial Regional Geology Studies

The overall regional geologic model resulting from interagency coordination, literature surveys, and map and remote sensing studies will assist in the decisions concerning the most efficient and economical project components and their tentative siting. As this project formulation proceeds, the potential need, or lack thereof, for produced rock materials will develop. During the coordination and information survey stages, information can be sought concerning existing sources of rock material in the region. On-line computer aided information retrieval services are readily accessible and can provide detailed reference lists. Information on regional and local geology, etc., relevant to site selection and design may be available from the U.S. Geological Survey. The U.S. Bureau of Reclamation maintains data on their project quarries as a function of broad rock genesis. Additional information on data sources is contained in EM 1110-1-1804. As part of the development of the geology of the region, special attention should be paid to the existence of regional stress fields in terms of how they may affect potential quarry excavations and produced rock products. In addition to determining groundwater conditions for normal project purposes, their effect on potential quarry excavations should be assessed.

3-3. Field Reconnaissance

Field reconnaissance should be made concurrent with, or immediately following the regional geologic studies. While the field reconnaissance stage does not include detailed studies such as geologic mapping, there are a number of observations that can be made that will assist in the decision to employ test quarry programs and in the probable quality of rock fill material that would be produced. Rock types, as noted from existing geologic maps, literature, and remote sensing studies can be confirmed. Tentative depths of overburden and weathered rock can be established. Outcrop observations can provide preliminary information on geologic structure and fracture frequency. Terrain conditions as they relate to tentatively selected required excavations can be determined. From the information obtained during the field reconnaissances, preliminary test quarry layouts can be developed, blasted rock gradations and relative amounts of rock waste can be predicted, follow-on investigations planned and program costs can be estimated.

3-4. Survey of Existing Excavations

As part of the field reconnaissances, or as a separate activity, known existing rock quarries and underground excavations, such as mines and tunnels should be visited and assessed. The USAEWES (1988) Technical Memorandum 6-370 provides information on, and test data from, quarries in the local area. Information can be obtained on lithology, structure, and fabric for the same or rock types similar to those at the tentative project locations. Information on produced rock gradations and amounts of rock waste can be obtained. Blasting patterns, types of explosives and blasting procedures can be assessed. Information on required processing and processing equipment (grizzlies, crushers, screens, etc.) can be obtained. When visiting quarry operations, check sheets should be prepared and filled out to assure that pertinent information is obtained. Items which should be included in such check sheets are shown in Table 3-1.

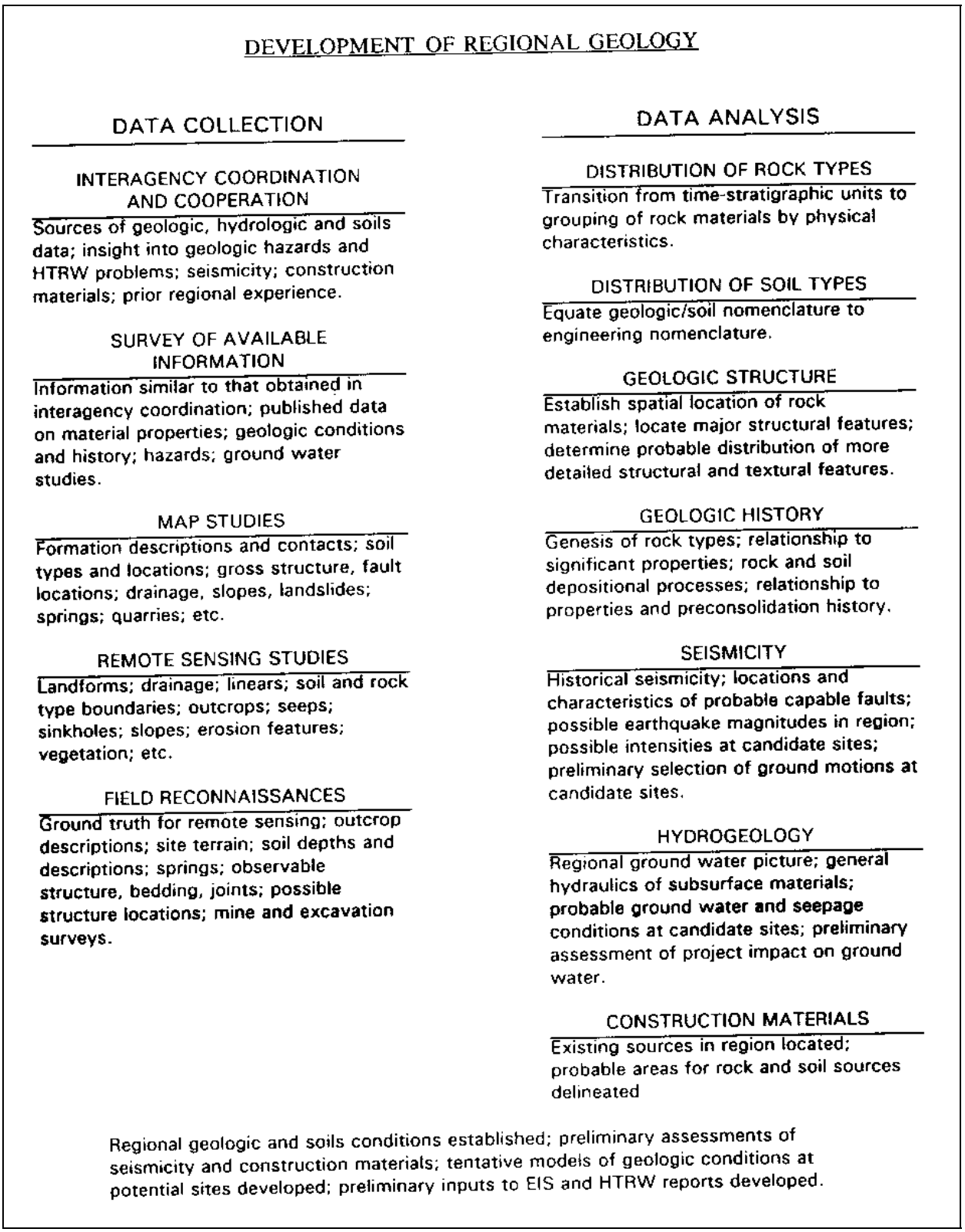

Figure 3-1. Schematic diagram of the development of regional geology (adapted from EM 1110-1-1804)

Table 3-1
Items for Inclusion in Quarry Inspection Check Sheets

Project and quarry	Blast hole drilling sizes and patterns	Rock size and gradation requirements
Dates of operation		
Purpose of quarry	Explosives used and powder factors	Volumes of rock produced
Rock type with lithologic descriptions	Hauling and processing equipment	Records of disputes between contractor and client
Rock structure and fabric	Relation of natural block sizes to rock comminution	Rock service records
Descriptions and costs of investigations	Amounts of rock waste	Remarks
Lab test data		